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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,006	11/03/2003	Donald W. Verser	210331US (CPCM:0019/FLE)	3672

47514 7590 12/10/2007

FLETCHER YODER (CHEVRON PHILLIPS)
P. O. BOX 692289
HOUSTON, TX 77069

EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
12/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/700,006	VERSER ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6-16,20-22,24,25,27-36,39-41 and 43-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6-16,20-22,24,25,27-36,39-41 and 43-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on September 19, 2007 has been received and carefully considered. Claims 4, 5, 17-19, 23, 26, 37, 38 and 42 are cancelled. Claim 52 is new. Claims 1-3, 6-16, 20-22, 24, 25, 27-36, 39-41 and 43-52 are under consideration.

Claim Objections

2. Claim 1 is objected to because of the following informalities:

In line 24: "the recycle zone" should be changed to --a recycle zone--.

In lines 25-26: "a recycle zone" should be changed to --the recycle zone--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-3, 6-16, 20-22, 24, 25, 27-35, 44, 45 and 52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 1, it is unclear as to where the newly added limitation of, "passing a second portion of the recovered hydrocarbon fluid stream as vapor from the recovery zone to the recycle zone," at lines 23-24, is supported in the originally filed disclosure.

In claim 15, it is unclear as to where the newly added limitation of, "a recycle tank adapted... to receive a second hydrocarbon fluid stream as vapor from the hydrocarbon/purge gas recovery unit," at lines 21-23, is supported in the originally filed disclosure.

In claim 25, it is unclear as to where the newly added limitation of, "passing at least a portion of the recovered hydrocarbon fluid stream as vapor from the recovery zone to the recycle zone," at lines 22-23, is supported in the originally filed disclosure.

For instance, as noted from the specification (with emphasis added):

> [0041]... The separated diluent and other hydrocarbons (recovered hydrocarbon liquids) can be returned to the recycle tank 30 through a first hydrocarbons path 53 (e.g., a conduit through which hydrocarbons exit the INRU and are transferred to other equipment) and ultimately returned to the loop reactor 14. Alternatively, some or all of the liquids from the INRU 28 may be sent to a heavies column 32 through a second hydrocarbons path 55. The INRU is designed to produce a liquid product which contains substantially all the hydrocarbons (other than the solid polymer particles) removed in the purge column.
>
> [0046] ... The purge gas and hydrocarbon fluids are separated in hydrocarbon/purge gas recovery unit 228 ... Hydrocarbon from the recovering unit 228, preferably in liquid form are transferred to the recycle tank 230 and/or the first fractionation column 232, through first and/or second hydrocarbon paths, respectively.

Thus, it appears that the hydrocarbon fluid stream is passed as a liquid, and not a vapor, from the recovery zone or hydrocarbon/purge gas recovery unit (28,228) to the recycle tank (30,230).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in

> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 2, 6, 7, 9-14, 25, 27 and 29-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885).

Regarding claims 1, 6, 7, 14, 25, 27 and 34 Rosenbaum et al. (see Figure; generally, column 6, line 5 to column 10, line 25) discloses a process for slurry polymerization and for separating hydrocarbon fluid from solid polymer particles and purge gas, comprising:

polymerizing in a reaction zone **25** at least one olefin monomer to produce a slurry, comprising solid polymer particles and hydrocarbon fluid (see column 1, line 5 to column 2, line 30);

withdrawing a portion of the slurry from the reaction zone **25** (i.e., via line **26**);

separating at least a majority of the hydrocarbon fluid from the solid polymer particles in an intermediate pressure zone as a vaporized hydrocarbon fluid stream (i.e., by pressure let down via throttle valves **27**,**31** and separation of phases in vessels **28**,**32**, with the vaporized hydrocarbon exiting via line **69**,**70**; see column 2, line 60 to column 3, line 50);

condensing the vaporized hydrocarbon fluid stream in a condensing zone **72**, whereby a condensed hydrocarbon fluid stream is formed;

transferring the condensed hydrocarbon fluid stream from the condensing zone **72** to a recycle

zone (i.e., vessel **73**);

transferring the solid polymer particles from the intermediate pressure zone to a purge zone (i.e., vessel **38**) in which a purge gas (i.e., steam, supplied via line **37**) is passed through the solid polymer particles to remove entrained hydrocarbon fluid, thereby forming a mixed stream containing hydrocarbon vapor and purge gas (i.e., in line **40**);

transferring the mixed stream to a recovery zone (i.e., cooler **41**/vessel **42**) where the purge gas and the hydrocarbon fluid are separated to form a water phase of condensed steam (i.e., exiting via **43**) and a recovered hydrocarbon fluid stream (i.e., exiting via **44**);

passing at least a portion of the recovered hydrocarbon fluid stream **44** from the recovery zone **41/42** to a fractionation zone **46**;

passing at least a portion of the recovered hydrocarbon fluid stream as vapor from the recovery zone **41/42** to the recycle zone **73** (i.e., indirectly, to line **63**, to line **69**, **70**, **71**; the hydrocarbon fluid stream is a diluent-solvent vapor in at least line **63**, see column 6, line 65 to column 7, line 40);

transferring vapor, or substantially no liquid, from the recycle zone **73** to a fractionation zone **78** (i.e., via line **75**); and

transferring hydrocarbon liquid from the recycle zone **73** to the reaction zone **25** (i.e., via line **74**) without fractionating the hydrocarbon liquid.

In Rosenbaum et al., the step of purging the polymer solids (i.e., in vessel **38**) uses a purge gas comprising steam (i.e., supplied via line **37**) to remove the residual hydrocarbon entrained in the polymer solids. The steam is separated from the hydrocarbon by condensing the steam in a cooler **41** and removing, via line **43**, the condensed steam as a water phase from the

vessel **42**. Rosenbaum et al. is silent as to the use of a different purge gas for removing the residual hydrocarbon entrained in the polymer solids, e.g., a non-condensable purge gas, such that the separation of the purge gas from the residual hydrocarbon involves the separation of a gas phase (and not a liquid, water phase) from the residual hydrocarbon in the recovery zone.

Sherk et al. teaches a process for removing diluent from a polymer solid comprising the steps of purging a polymer solid (i.e., in a purge column **20**) with a purge gas (e.g., nitrogen; column 2, lines 29-31) to remove residual hydrocarbon entrained in the polymer solids, to form a first stream comprising the purge gas and the residual hydrocarbon (i.e., exiting the top of the purge column **20**, see figure); and separating the purge gas from the first stream in a recovery zone (i.e., comprising vessels **42**, heat exchanger **44**, compressors **28**,**32**, etc.), to form a second stream comprising separated purge gas (i.e., in recycle line **50**), and a third stream comprising primarily hydrocarbon (e.g., an isobutene stream, see figure).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a different purge gas, e.g., a non-condensable purge gas, and a corresponding recovery zone for the purge gas steam in the process of Rosenbaum et al., absent a showing of unexpected results thereof, because the substitution of one known equivalent technique (of removing diluent from a polymer solid) for another was held to be obvious, even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

In addition, Sherk et al. (see Figure; column 2, line 68 to column 3, line 5) teaches the

step of passing at least a portion of the recovered purge gas stream **50** from the recovery zone to the purge zone **20**. It would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide the step of passing at least a portion of the recovered purge gas stream from the recovery zone to the purge zone in the modified process of Rosenbaum et al., because such step would allow for the additional recovery of any diluent remaining in the purge gas stream. As indicated in Sherk et al., such recovery would be desirable in order to minimize loss of diluent, and thereby minimize operating costs and hydrocarbon emissions (see column 1, lines 47-59).

Regarding claim 2, as best understood, Sherk et al. teaches the step of passing a second portion of the recovered purge gas stream **50** from the recovery zone to a closed loop transfer zone (see closed flow loop in the figure).

Regarding claims 9 and 29, Sherk et al. further teaches that the recovered purge gas stream from the recovery zone is not flared, but recovered (see column 3, lines 58-52).

Regarding claims 10-13 and 30-33, Sherk et al. further teaches that the recovered purge gas stream contains a very low concentration of hydrocarbon (see column 3, lines 54-60; column 3, line 67 to column 4). Although the claimed concentrations of hydrocarbon in the recovered purge gas stream (in ppm) are not explicitly taught in Sherk et al., it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate concentration of hydrocarbon (in ppm) for the recovered purge gas stream in the modified process of Rosenbaum et al. because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 35, Sherk et al. further teaches that the recovered purge gas stream **50** is at least partially used for providing a motive force to the solid polymer particles which have already passed through the purge zone **20** (see intersection of line **50** with the stream exiting the purge column **20**; figure).

5. Claims 3 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885), as applied to claim 1 above, and further in view of Sung (US 5,314,579).

Rosenbaum et al. is silent as to the step of feeding purge gas to an extrusion feed zone. Sung (see figure; column 5, line 39 to column 6, line 21) teaches an extrusion feed zone (i.e., tank **60**, for feeding an extruder, not shown, via line **82**), where a purge gas (i.e., steam, N_2) is fed the extruder feed zone. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the step of feeding purge gas to an extrusion feed zone in the modified process of Rosenbaum et al., because such would allow for any remaining hydrocarbon to be removed from the polymer particles before sending the polymer particles to an extruder for final processing, as taught by Sung. In addition, it would have been obvious for one of ordinary skill in the art at the time the invention was made to feed either a recovered purge gas and/or a fresh purge gas to the extrusion feed zone or purge zone in the modified process of Rosenbaum et al., for the known and expected result of obtaining a mixed feed stream of the desired hydrocarbon concentration, and a recovered purge gas or hydrocarbon stream of the desired concentrations.

6. Claims 8 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885), as applied to claims 1,

6, 7, 25 and 27 above, and further in view of Findlay (US 3,035,040).

Rosenbaum et al. further discloses processing the equilibrium vapor in the fractionation system **78** to generate a liquid hydrocarbon that is recycled to the reactor **25** (i.e., via line **84**). Rosenbaum et al., however, is silent as to using the liquid hydrocarbon in catalyst preparation and delivery. Findlay, however, teaches the use of recycled diluent in catalyst preparation and delivery (i.e., recycle solvent in line **39**, in combination with catalyst mud feeder **16**; Figure). It would have been obvious for one of ordinary skill in the art at the time the invention was made to use the liquid hydrocarbon from the fractionation system in catalyst preparation and delivery in the modified process of Rosenbaum et al., because it is preferable to suspend the catalyst in a diluent if the catalyst is in a particular form, as taught by Findlay (see column 2, lines 53-58). With respect to the transfer of a minor or a major portion of the liquid hydrocarbon to the catalyst mud preparation zone or the recycle zone, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate amount of liquid hydrocarbon to transfer to each of the catalyst mud preparation and the recycle zones in the modified process of Rosenbaum et al. because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*.

7. Claims 15, 16, 20, 22, 24 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Hanson (US 5,597,892) and Sung (US 5,314,579).

Regarding claims 15 and 16, Rosenbaum et al. (see Figure; generally described at column 6, line 5 to column 10, line 25) discloses an apparatus comprising:

(a) a polymerization reactor **25** in which one or more olefins are polymerized to form solid polymer particles in a hydrocarbon fluid (see column 1, line 5 to column 2, line 30);

(b) an intermediate pressure chamber **28,32** having an inlet for receiving hydrocarbon fluid and polymer from the polymerization reactor **25**, a polymer outlet (e.g., to line **29,33**), and a gas outlet (e.g., to line **69,70**); (see also column 2, line 60 to column 3, line 51);

(c) a condenser **72** fluidically connected to the gas outlet of the intermediate pressure chamber (i.e., via line **71**);

(d) a purge column (i.e., vessel **38**) fluidically connected to the polymer outlet of the intermediate pressure chamber (i.e., via line **33**);

(e) a hydrocarbon/purge gas recovery unit (i.e., cooler **41**/vessel **42**) adapted to separate hydrocarbon fluid from the purge gas, the recovery unit fluidically connected to a top portion of the purge column **38**;

(f) a recycle tank (i.e., vessel **73**) adapted to receive condensed hydrocarbon vapor from the condenser **72** and hydrocarbon fluid stream as vapor from the hydrocarbon/purge gas recovery unit **41/42** (i.e., indirectly, via line **44**, to line **63**, to lines **69**, **70**, **71**; the hydrocarbon fluid stream is a diluent-solvent vapor in at least line **63**, see column 6, line 65 to column 7, line 40 and Figure);

(g) at least one conduit (i.e., line **74**) fluidically connected to a bottom portion of the recycle tank **73**, adapted to transport the condensed hydrocarbon fluid from the recycle tank **73** to the reactor **25** without transporting the condensed hydrocarbon fluid through a fractionation system; and

(h) a vapor delivery conduit (i.e., line **75**) coupled to a top portion of the recycle tank **73** and

fluidically connected to a first fractionation column **78**.

Rosenbaum et al. is silent as to the provision of a pump under item (g). Hanson, however, evidences the conventionality of providing a pump **44** for enabling the pumping of recovered hydrocarbon liquid from a recycle tank **42** back to a polymerization reactor **10**, via conduit **16** (see FIG. 1; column 3, lines 8-9). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a pump for pumping the recovered hydrocarbon liquid from the recycle tank **73** to the reactor **25** in the apparatus of Rosenbaum et al., on the basis of suitability for the intended use thereof, because the provision of a pump for pumping the recovered hydrocarbon liquid from the recycle tank to the polymerization reactor would have been considered conventional in the art, as evidenced by Hanson, and furthermore, the pump would have enabled the feeding of recovered hydrocarbon liquid to the reactor to occur at a desired pressure and flow rate.

Rosenbaum et al. is also silent as to the provision of an extruder feed tank under item (i), where a fresh purge gas feed is connected to the extruder feed tank. Sung (see figure; column 5, line 39 to column 6, line 21) teaches an extruder feed tank (i.e., tank **60**, for feeding an extruder, not shown, via line **82**), where a fresh purge gas feed (i.e., steam, N_2) is connected to the extruder feed tank. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an extruder feed tank, with a fresh purge gas feed, in the modified apparatus of Rosenbaum et al., on the basis of suitability for the intended use thereof, because such would allow for any remaining hydrocarbon to be removed from the polymer particles before sending the polymer particles to an extruder for final processing, as taught by Sung.

Regarding claim 20, Rosenbaum et al. discloses that the first fractionation column **78**

does not have a side draw (see figure).

Regarding claim 22, although Rosenbaum et al. is silent as to the provision of a second fractionation column adapted to receive a top product from the first fractionation column **78**, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a second fractionation column in the modified apparatus of Rosenbaum et al., on the basis of suitability for the intended use thereof, because the duplication of parts was held to have been obvious, *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960), and the provision of a second fractionation column for enabling further separation of the fluid components would have been considered conventional in the art, as evidenced by the provision of the first and second fractionation columns **46** and **53** in the apparatus of Rosenbaum et al.

Regarding claim 24, Rosenbaum et al. does not disclose a purge gas flare being connected to the recovery unit **41/42**. Rosenbaum et al. merely states that a gas in line **48** is vented (see column 10, lines 1-8). No flame is disclosed.

Regarding claim 45, although Sung et al. is silent as to the purge gas (i.e., steam, N_2) for the extruder feed tank **60** comprising a recovered purge gas from a recovery zone, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the extruder feed tank to receive a recovered purge gas stream from the recovery zone in the modified apparatus of Rosenbaum et al., on the basis of suitability for the intended use thereof, because the recycling of process fluids to minimize cost and emissions would have been considered conventional in the art.

8. Claims 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et

al. (US 3,816,379) in view of Hanson (US 5,597,892) and Sung (US 5,314,579), as applied to claims 15, 20 and 22 above, and further in view of Findlay (US 3,035,040).

Rosenbaum et al. further discloses processing the equilibrium vapor in the fractionation system **78** to generate a liquid hydrocarbon that is recycled to the reactor **25** (i.e., via liquid delivery conduit **84**). Rosenbaum et al., however, is silent as to feeding the liquid hydrocarbon to a catalyst preparation tank. Findlay, however, teaches the feeding of a liquid hydrocarbon (in line **39**) to a catalyst preparation tank **16**. It would have been obvious for one of ordinary skill in the art at the time the invention was made to supply the liquid hydrocarbon from the liquid delivery conduit to a catalyst preparation tank in the modified apparatus of Rosenbaum et al., because it is preferable to suspend the catalyst in a diluent if the catalyst is in a particular form, as taught by Findlay (see column 2, lines 53-58).

9. Claims 36, 39, 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Hanson (US 5,597,892).

Regarding claim 36, Rosenbaum et al. (see Figure; generally described at column 6, line 5 to column 10, line 25) discloses an apparatus comprising:

(a) a polymerization reactor **25** in which one or more olefins are polymerized to form solid polymer particles in a hydrocarbon fluid (see column 1, line 5 to column 2, line 30);

(b) an intermediate pressure chamber **28, 32** having an inlet for receiving hydrocarbon fluid and polymer from the polymerization reactor **25**, a polymer outlet (e.g., to line **29, 33**), and a gas outlet (e.g., to line **69, 70**); (see column 2, line 60 to column 3, line 51);

(c) a condenser **72** fluidically connected to the gas outlet of the intermediate pressure chamber (i.e., via line **71**);

(d) a purge column (i.e., vessel **38**) fluidically connected to the polymer outlet of the intermediate pressure chamber (i.e., via line **33**);

(e) a hydrocarbon/purge gas recovery unit (i.e., cooler **41**/vessel **42**) adapted to separate hydrocarbon fluid from the purge gas, the recovery unit fluidically connected to a top portion of the purge column **38** (i.e., via line **40**);

(f) a recycle tank (i.e., vessel **73**) adapted to receive condensed hydrocarbon vapor directly from the condenser **72** and to receive hydrocarbon fluid from the hydrocarbon/purge gas recovery unit **41/42** (i.e., indirectly, via line **44**, to line **63**, to line **69**, **70**, **71**);

(g) a liquid delivery conduit (i.e., line **74**) fluidically connecting a bottom portion of the recycle tank **73** with the reactor **25**, wherein the fluidic connection between the recycle tank **73** and the reactor **25** does not include a fractionation column; and

(h) a vapor delivery conduit (i.e., line **75**) coupled to a top portion of the recycle tank **73** and fluidically connected to a first fractionation column **78**.

The apparatus of Rosenbaum et al. is the same as the instantly claimed apparatus, except that Rosenbaum et al. is silent as to the polymerization reactor **25** comprising a "loop" polymerization reactor.

Hanson, however, teaches a conventional apparatus comprising a loop polymerization reactor **10**, in which the apparatus is particularly applicable to the polymerization of olefins in slurry form (see column 3, lines 34-57; FIG. 1; column 2, lines 50-59).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the loop polymerization reactor **10** as taught by Hanson for the polymerization reactor **25** in the apparatus of Rosenbaum et al., because the loop polymerization

reactor would have predictably provided a satisfactory means for enabling the polymerization of olefins in slurry form. In addition, substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when a structure already known in the prior art is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

Regarding claim 39, although Rosenbaum et al. is silent as to the provision of a second fractionation column adapted to receive a top product from the first fractionation column **78**, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a second fractionation column in the modified apparatus of Rosenbaum et al., on the basis of suitability for the intended use thereof, because the duplication of parts for multiplied effect was held to have been obvious, *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960), and the provision of a second fractionation column for enabling further separation of the fluid components would have been considered conventional in the art, as evidenced by the provision of the first and second fractionation columns **46** and **53** in the apparatus of Rosenbaum et al.

Regarding claim 41, as shown in the figure, none of the fractionation columns of Rosenbaum et al. comprise sidedraws.

Regarding claim 43, Rosenbaum et al. does not disclose a purge gas flare in connection with the recovery unit **41/42**. Rosenbaum et al. merely states that a gas in line **48** is vented (see column 10, lines 1-8). No flame is disclosed.

10. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Hanson (US 5,597,892), as applied to claims 36 and 39 above, and further in view of Findlay (US 3,035,040).

Rosenbaum et al. further discloses processing the equilibrium vapor in the fractionation system **78** to generate a liquid hydrocarbon that is recycled to the reactor **25** (i.e., via liquid delivery conduit **84**). Rosenbaum et al., however, is silent as to feeding the liquid hydrocarbon to a catalyst preparation tank. Findlay, however, teaches the feeding of a liquid hydrocarbon (in line **39**) to a catalyst preparation tank **16**. It would have been obvious for one of ordinary skill in the art at the time the invention was made to supply the liquid hydrocarbon from the liquid delivery conduit to a catalyst preparation tank in the modified apparatus of Rosenbaum et al., because it is preferable to suspend the catalyst in a diluent if the catalyst is in a particular form, as taught by Findlay (see column 2, lines 53-58).

11. Claims 46 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379).

Regarding claim 46, Rosenbaum et al. (see Figure; generally described at column 6, line 5 to column 10, line 25) discloses a method of processing effluent **26** of a polymerization reactor **25**, the effluent comprising hydrocarbon liquid and polymer solids (see column 1, line 5 to column 2, line 29), the method comprising:

separating a majority of the hydrocarbon liquid from the polymer solids in the effluent by flashing the majority of the hydrocarbon liquid to generate a hydrocarbon vapor (i.e., by pressure let down via throttle valves **27**,**31** and separation of phases in vessels **28**,**32**; see column 2, line 60 to column 3, line 50);

transporting and condensing the hydrocarbon vapor to form a recovered hydrocarbon liquid (i.e., vapor from the vessels **28,32** is transported to a condenser **72** via lines **69,70,71** for partial condensation);

transporting an equilibrium vapor of the recovered hydrocarbon liquid to a fractionation system (i.e., the vapor phase in vessel **73** is sent to a fractionator **78** via line **75**; see column 5, lines 20-36); and

recycling at least a portion of the recovered hydrocarbon liquid to the polymerization reactor **25** without fractionating the recovered hydrocarbon liquid (i.e., the liquid phase in vessel **73** is sent directly to the reactor **25** via line **74**; see also column 4, lines 43-58).

The process of Rosenbaum et al. is the same as the instantly claimed process, except that Rosenbaum is silent as to the equilibrium vapor of the recovered hydrocarbon liquid being transported to the fractionation system without compression (i.e., in contrast, Rosenbaum et al. shows a compressor at **76**; column 7, lines 34-41).

Rosenbaum et al., however, further discloses that, "[t]he conditions in the fractionating column **78** as previously set forth are such as to separate as overhead through line **79** pure, unreacted light monomer." (see column 7, lines 42-48). And, as indicated in column 1, line 5 to column 2, line 6, a variety of different monomers may be employed in the polymerization process, as well as a variety of different diluent-solvent systems. As is well known in the art, different compositions of monomer, impurities and diluent-solvent will exhibit differing degrees of separation at a given pressure and temperature. The pressure and temperature in the fractionating column **78** will therefore require customization, depending on the monomer, impurity and diluent-solvent components present in stream **75**, in order to achieve the desired

degree of separation of the components. And, in particular, one having ordinary skill in the art would clearly recognize that for a given composition of monomer, impurities and diluent-solvent, *no additional compression/pressure may be necessary* to achieve the desired degree of separation. For instance, one may only need to modify the temperature of the fractionating column to achieve the desired degree of separation.

Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the parameters of temperature and pressure in the fractionating column **78** in the process of Rosenbaum et al., to optimize the degree of separation of any light impurities and diluent-solvent from the unreacted light monomer, as it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233*. Furthermore, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to transport the equilibrium vapor to the fractionation system **78** *without compression*, on the basis of suitability for a given composition of the monomer, impurities and diluent-solvent, and absent a showing of unexpected results thereof, because the particular composition may not require any additional compression to achieve the necessary degree of separation of the unreacted monomer from the impurities and residual diluent-solvent. If a person of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, §103 likely bars its patentability. *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

Regarding claim 49, Rosenbaum et al. further discloses the step of purging the polymer solids with a purge gas (e.g., steam) to remove residual hydrocarbon entrained in the polymer

solids, to form a first stream (i.e., in line **40**, from vessel **38**) comprising purge gas and the residual hydrocarbon (see column 8, lines 37-58; Figure).

12. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Hanson (US 5,597,892).

Rosenbaum et al. (Figure) discloses that the recycling comprises transporting the recovered hydrocarbon liquid to a recycle tank (i.e., a vessel **73**) and feeding the recovered hydrocarbon liquid from the recycle tank **73** to the polymerization reactor **25**. Rosenbaum et al., however, does not show a pump in line **74** for "pumping" the recovered hydrocarbon liquid from the recycle tank to the polymerization reactor **25**. Hanson, however, evidences the conventionality of providing a pump **44** for enabling the pumping of recovered hydrocarbon liquid from a recycle tank **42** back to a polymerization reactor **10**, via conduit **16** (see FIG. 1; column 3, lines 8-9). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a pump for pumping the recovered hydrocarbon liquid from the recycle tank **73** to the reactor **25** in the process of Rosenbaum et al., because the provision of a pump for pumping the recovered hydrocarbon liquid from the recycle tank to the polymerization reactor would have been considered conventional in the art, as evidenced by Hanson, and furthermore, the pump would have enabled the feeding of recovered hydrocarbon liquid to the reactor to occur at a desired pressure and flow rate.

13. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Findlay (US 3,035,040).

Rosenbaum et al. further discloses processing the equilibrium vapor in the fractionation system **78** to generate a diluent substantially free of olefin that is recycled to the reactor **25** (i.e.,

via line **84**). Rosenbaum et al., however, is silent as to using the diluent in catalyst preparation and delivery. Findlay, however, teaches the use of recycled diluent in catalyst preparation and delivery (i.e., recycle solvent in line **39**, in combination with catalyst mud feeder **16**; Figure). It would have been obvious for one of ordinary skill in the art at the time the invention was made to use the diluent in catalyst preparation and delivery in the process of Rosenbaum et al., because it is preferable to suspend the catalyst in a diluent if the catalyst is in a particular form, as taught by Findlay (see column 2, lines 53-58).

14. Claims 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885).

In Rosenbaum et al., the step of purging the polymer solids (i.e., in vessel **38**) uses a purge gas comprising steam (i.e., supplied via line **37**) to remove the residual hydrocarbon entrained in the polymer solids. The steam is separated from the hydrocarbon by condensing the steam in a cooler **41** and removing, via line **43**, the condensed steam as a water phase from the vessel **42**. Rosenbaum et al. is silent as to the use of a different purge gas for removing the residual hydrocarbon entrained in the polymer solids, e.g., a non-condensable purge gas, such that the separation of the purge gas from the residual hydrocarbon involves the separation of a gas phase (and not a liquid, water phase) from the residual hydrocarbon.

Sherk et al. teaches a process for removing diluent from a polymer solid comprising the steps of purging a polymer solid (i.e., in a purge column **20**) with a purge gas (e.g., nitrogen; column 2, lines 29-31) to remove residual hydrocarbon entrained in the polymer solids, to form a first stream comprising the purge gas and the residual hydrocarbon (i.e., exiting the top of the purge column **20**, see figure); and separating the purge gas from the first stream to form a second

stream comprising separated purge gas (i.e., in recycle line **50**), and a third stream comprising primarily hydrocarbon (e.g., an isobutene stream, see figure).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute a different purge gas, e.g., a non-condensable purge gas, for the purge gas in the process of Rosenbaum et al., absent a showing of unexpected results thereof, because the substitution of one known equivalent technique (of removing diluent from a polymer solid) for another was held to be obvious, even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

In addition, it would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide the step of transporting the second stream (comprising the separated purge gas) to the recycle tank or to the fractionation system, or a combination thereof, in the modified process of Rosenbaum et al., because such step would allow for the additional recovery of any diluent remaining in the purge gas stream. As indicated in Sherk et al., such recovery would be desirable in order to minimize loss of diluent, and thereby minimize operating costs and hydrocarbon emissions (see column 1, lines 47-59).

15. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885), as applied to claim 1 above, and further in view of Hanson (US 5,597,892).

Rosenbaum et al. is silent as to the polymerization reactor **25** comprising a "loop" polymerization reactor. Hanson, however, teaches a conventional apparatus comprising a loop

polymerization reactor **10**, in which the apparatus is particularly applicable to the polymerization of olefins in slurry form (see column 3, lines 34-57; FIG. 1; column 2, lines 50-59). Sherk et al. similarly teaches a loop polymerization reactor **10**, suitable for the polymerization of olefins in slurry form (see Figure; column 2, lines 10-45). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the loop polymerization reactor **10** as taught by either Hanson or Sherk et al. for the polymerization reactor **25** in the modified apparatus of Rosenbaum et al., because the loop polymerization reactor would have predictably provided a satisfactory means for enabling the polymerization of olefins in slurry form. In addition, the substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and when a structure already known in the prior art is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result, *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

Response to Arguments

Applicant's arguments filed on September 19, 2007 have been fully considered but they are not persuasive.

16. Comments regarding the rejection of claims 36, 39, 41 and 43 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Hanson (US 5,597,892); and the rejection of claim 40 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Hanson, as applied to claims 36 and 39 above, and further in view of Findlay (US 3,035,040).

Applicant (at page 16) argues,

> "Turning to the claims, independent claim 36, as amended, recites a "loop polymerization reactor." In contrast, Rosenbaum discloses a reaction vessel 25. Rosenbaum is absolutely devoid of a loop polymerization reactor. This is not surprising considering the age of the reference, for example. For this reason alone, the cited reference cannot anticipate claim 36 or its dependent claims.
>
> Further, claim 36, as amended, recites "a recycle tank adapted to receive hydrocarbon liquid from the condenser and to receive hydrocarbon fluid from the hydrocarbon/purge gas recovery unit." Conversely, the Rosenbaum storage vessel 73, which the Examiner labels as a recycle tank, only receives one input (liquid from condenser 72). Clearly, the storage tank 73 does not receive hydrocarbon fluid from a hydrocarbon/purge gas recovery unit, as claimed. Indeed, the entire Rosenbaum reference is devoid of this feature. Therefore, Rosenbaum cannot anticipate claim 36 or its dependent claims for this additional reason."

Firstly, with respect the newly added limitation of a "loop polymerization reactor", the secondary reference to Hanson has been applied.

Secondly, the recycle tank 73 ultimately receives at least a portion of the hydrocarbon fluid from the hydrocarbon/purge gas recovery unit 41/42 in Rosenbaum et al. As indicated in the rejection, the recycle tank 73 receives at least a portion of the hydrocarbon fluid from the hydrocarbon/purge gas recovery unit 41/42 -- *indirectly*, via line 44, to line 63, to line 69, 70, 71. These lines carry at least a portion of the diluent-solvent that is processed by the apparatus (see, e.g., column 6, line 49 to column 7, line 40), wherein the diluent-solvent comprises a hydrocarbon fluid (see column 1, line 65 to column 2, line 6). It is noted that the features upon which Applicant relies (e.g., a line *directly* connecting the hydrocarbon/purge gas recovery unit to the recycle tank, for conveying the hydrocarbon fluid as vapor) are not recited in the rejected

claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

17. Comments regarding the rejection of claims 46 and 49 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379); the rejection of claim 47 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Hanson (US 5,597,892); the rejection of claim 48 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Findlay (US 3,035,040); and the rejection of claims 50 and 51 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Sherk et al. (US 4,501,885).

Applicant (at page 17, first paragraph) argues,

> "Claim 46, as amended, recites "transporting an equilibrium vapor of the recovered hydrocarbon liquid without compression to a fractionation system." (Emphasis added). Quite the opposite, Rosenbaum discloses that vapor (in line 25) from storage vessel 73 is compressed (via compressor 76) prior to introduction to fractionating column 78. Indeed, applicants believe such compression is necessary in the Rosenbaum system so to provide for reentry of the fluid (via reflux tank 81 and line 84) to the reactor 25."

The Examiner respectfully disagrees. With respect to the newly added limitation of the transport "without compression", please refer to the comments made in the rejection of claim 46, above.

18. Comments regarding the rejection of claims 1, 2, 6, 7, 9-14, 25, 27 and 29-35 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. (US 3,816,379) in view of Sherk et al. (US 4,501,885); the rejection of claims 3 and 44 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Sherk et al., as applied to claim 1 above, and further in view of Sung (US 5,314,579); the rejection of claims 8 and 28 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Sherk et al., as applied to claims 1, 6, 7, 25 and 27

above, and further in view of Findlay (US 3,035,040); the rejection of claims 15, 16, 20, 22, 24 and 45 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Hanson (US 5,597,892) and Sung; the rejection of claims 21 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Hanson and Sung, as applied to claims 15, 20 and 22 above, and further in view of Findlay (US 3,035,040); and the rejection of claim 52 under 35 U.S.C. 103(a) as being unpatentable over Rosenbaum et al. in view of Sherk et al., as applied to claim 1 above, and further in view of Hanson.

Applicant (at page 19) argues,

> "...the Rosenbaum storage vessel 73 receives only one input (via line 71). Second, the Rosenbaum does not transport recovered hydrocarbon fluid from a recovery unit to the storage vessel 73, as claimed. Applicants disagree with the Examiner's contention that the stream (in line 44) is transferred to the storage vessel 73. Nevertheless, the stream in line 44 is a liquid and not a vapor, as claimed. Moreover, the secondary references cited by the Examiner do not obviate these deficiencies of Rosenbaum."

The Examiner respectfully disagrees.

Firstly, it appears that the "vapor" stream lacks support in the originally filed disclosure. See 35 U.S.C. 112, first paragraph, rejection above.

Secondly, the recycle tank 73 ultimately receives at least a portion of the hydrocarbon fluid from the hydrocarbon/purge gas recovery unit 41/42 in Rosenbaum et al. As indicated in the rejection, the recycle tank 73 receives at least a portion of the hydrocarbon fluid from the hydrocarbon/purge gas recovery unit 41/42 -- *indirectly*, via line 44, to line 63, to line 69, 70, 71. These lines carry at least a portion of the diluent-solvent that is processed by the apparatus (see, e.g., column 6, line 49 to column 7, line 40), wherein the diluent-solvent comprises a

hydrocarbon fluid, and wherein the diluent-solvent, in at least line 63, comprises a vapor (see column 1, line 65 to column 2, line 6). It is noted that the features upon which Applicant relies (e.g., a line *directly* connecting the hydrocarbon/purge gas recovery unit to the recycle tank, for conveying the hydrocarbon fluid as vapor) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jal
November 29, 2007

Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700